

If I should describe them with a thousand instances and relations, and make mention of so many particulars, still there would not be a part in ten that I could bring within the compass of writing. But these few particulars I send for your excellency's information.

XL. *An Account of an Earthquake in the East Indies, of two Eclipses of the Sun and Moon, observed at Calcutta: In a Letter to the Reverend Thomas Birch, D. D. Secret. R. S. from the Reverend William Hirst, M. A. F. R. S.*

To the Reverend Thomas Birch, D. D. Secretary to the Royal Society.

Reverend Sir,

Calcutta, Nov. 3d 1762,

Read Nov. 17, 1763. **T**O the inclosed accounts of the transit of Venus, I have subjoined others of an extraordinary earthquake felt in this part of the world, which, I flatter myself, will not be unacceptable to the Royal Society. This earthquake happened the second day of April last, was very violent in the kingdoms of Bengal, Aracan, and Pegu, but particularly at the metropolis of Aracan, where, according to the accounts of an English merchant residing there, the effects have been as fatal as at Lisbon,

bon, and where it is thought the chief force of the earthquake vented itself.

At Dacca, in this kingdom of Bengal, the consequences have been terrible: the rise of the waters in the river was so very sudden and violent, that some hundreds of large country boats were driven ashore, or lost, and great numbers of lives lost in them.

No less deplorable are the accounts from Chhatti-gaon in this same kingdom: three of these accounts I herewith inclose, one of them wrote by Mr. Edward Gulston, a young gentleman in the service of our East India Company, and two others, translations from a Persian original, made out by order of Mr. Verelst, chief of our East India Company's affairs in that province; in consequence of which account the Company's lands there, have not been so highly assessed as before this calamity. Both these accounts are translated from the same original; but that, which I received from governor Vansittart, being thought exaggerated for interested reasons, I begged of Mr. Gulston to give me a literal translation from the Persian, in which language he has made an uncommon progress, as much to his present honour, as I hope it will be to his future advantage. This favour he obligingly granted me, and I send it to you, Sir, not only to compare it with the other translation, but to give you some distant idea of the idiom and great simplicity of this eastern language.

The same earthquake was also very alarming at Ghioroty, where colonel Coote with His Majesty's troops are in cantonment about 18 miles up the river from this place. The waters in the river and tanks there were violently agitated, and, in many places,

rose to more than six feet perpendicular height, of which I had ocular conviction myself on my return from Chandernagore, a settlement lately belonging to the French, about three miles north from Ghirotty, and in latitude $22^{\circ} 54'$ N. where it was felt, but not in a great degree; for I myself knew nothing of it, till it was soon after told me by certain French gentlemen there.

Nearly at the same time was this earthquake felt at Calcutta, where, as I am informed, the agitation of the waters in the tanks rose upwards of six feet, and was in the direction north and south. The height of the thermometer on Farenheit's scale was then at Calcutta at $95^{\circ} 30'$ much higher than it had been observed to be during the whole month, the lowest descent of the mercury being 89 degrees. In this month was much thunder and lightening, and there were fresh gales of wind at S.E. the weather in general being close and sultry.

A subsequent earthquake was felt at Calcutta the 13th of July following at half past two in the afternoon. The thermometer was then at $87^{\circ} 4'$ at a medium, the wind S.W. and the weather fair: to this I was a witness myself, being then at dinner with captain Eifer, of his majesty's 84th regiment. The motion of the earth caused a very sensible vibration of the wine in our glasses, and the shock was repeated twice at the interval of a few seconds.

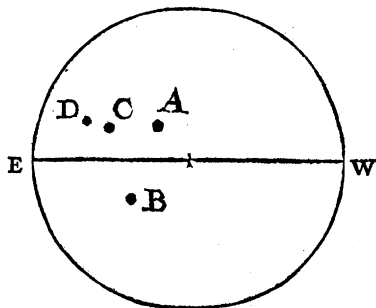
I conclude, Sir, with communicating to you the observations I made in these parts, of two remarkable eclipses of the Sun and Moon. The first was of the Sun, which I observed at Ghirotty on the banks of the Ganges, October 17th ult. where I

was then on a visit to colonel Coote. This indeed was a flying observation, or taken, as the French would say, *en passant*, being unprovided with a necessary apparatus. I had luckily adjusted (very carefully) my watch to apparent time, by the meridian line of a large sundial, on the noon immediately preceding the eclipse: my watch in general keeps time very well, but it not having a hand to shew seconds, I determined the seconds as near as I could by the minute hand. Though I had set my watch to the apparent time, I despaired of making any observation of this eclipse for want of a telescope, for which, happening to express some concern, not above half an hour before the eclipse was to come on, captain Eiser recollected he had a reflector, with which he immediately obliged me: it was about 16 inches long, and in very tolerable condition, so that I may venture to say this observation, though not perfect, may be depended on to be very near the truth.

I had not time nor conveniency to throw the Sun's image on a screen in a darkened room; so was obliged to lay it down as near as I could by my eye. The following scheme shews the solar maculæ, as they then appeared: the appulse of the Moon's limb to, and it's recess from them, being respectively noted by the literal references.

N. B. I examined my watch by the meridian line the succeeding noon of the eclipse, without being able to ascertain any sensible error, owing doubtless to the want of a better method of making the observations.

Observations of a solar eclipse made at Ghyrotty about the latitude $22^{\circ} 51'$ north, the watch adjusted to apparent time.



	H	M	S
Beginning of the lunar immerfion - - - -	2	49	30
Appulfe of the Moon's eastern limb to the spot A - - - - -	3	35	48
Appulfe of the fame to the spot B - - - -	3	41	42
Appulfe of the fame to the spot C - - - -	3	49	43
Appulfe of the fame to the spot D - - - -	3	53	0
Greatest vifible obfcurity near 11 degits eclipfed - - - - -	4	5	38
The Moon's western limb receding from the spot A - - - - -	4	46	50
The fame receding from the spot B - - - -	4	50	20
The fame receding from the spot C - - - -	5	0	8
The fame receding from the spot D - - - -	5	3	35
End of the eclipse - - - - -	5	12	20
Total duration - - - - -	2	22	50

The next obfervation was of the eclipse of the Moon, which I made yesterday in Conjunction with Mr. Hancock, at his houfe in Calcutta, to whom I am greatly obliged for fupplying me with fome excellent astronomical instruments, particularly with a large land quadrant of two feet radius, made by Cole in Fleet-ftreet, with which I took the corre-

pendent altitudes of the Sun to adjust his watch (which was furnished with a hand to distinguish seconds) to the apparent time, Mr. Hancock himself marking the Times while I observed. The telescope I used was a reflector made by Dollond, in perfect order, being sent out of England by the last ships, and in length about 22 inches.

Our first observation was on November the first, the day preceding the eclipse, the Sun's upper limb being at the horizontal wire of the quadrant's movable telescope, on the eastern side of the

		By the watch		
		H	M	S
meridian when the watch marked - - - -		9	50	30
Nov. 1.	Sun's upper limb at the same on the	14	24	31
○ Altitude,	western side - - - - -	24	15	1
47° 8'	Dividing the Sum by - - - - - 2	12	7	30
	Sun's center on the merid. by the watch	11	43	49
	Equation of the day - - - - -	0	23	41
	Watch faster than equated solar time -			

Nov. 2,	Sun's upper limb at the horizontal wire	10	24	33
	on the eastern side - - - - -			
○ Altitude,	The same at the same on the west side -	13	59	50
51° 26'.	Dividing the Sum by - - - - - 2	24	24	23
	Sun's center on the merid. by the watch	12	12	11
	Equation of the day - - - - -	11	43	48
	Watch faster than equated solar time -	0	28	23
	Watch faster yesterday - - - - -	0	23	41
	Gain of the watch these 24 hours - -	0	4	42

Observation of a lunar eclipse November 2, 1762,
made at Calcutta in the kingdom of Bengal, latitude
22° 30' N.

Immersion.	By the watch.			Apparent time.		
	H	M	S	H	M	S
The beginning of the eclipse at - -	1	15	10	1	7	40
Mare Humorum immersing - - -	1	24	54	1	17	24
Tycho immersing - - - - -	1	36	30	1	29	0
The shadow at the middle of Copernicus	2	9	33	2	2	3

Emerfions.						
Middle of Copernicus emerging -	2	50	27	2	42	57
Total emerfion of Tycho - - -	3	44	30	3	37	0 doubtful
End of the eclipse - - - - -	4	3	2	3	55	32
Total duration - - - - -	2	47	52	2	40	22

Near eight digits eclipsed by ocular estimation.

By the preceding observations the watch gained
4 minutes 42 seconds these 24 hours.

I have the honour to be,

S I R,

Your obliged and very humble servant,

William Hirst.